TRAIN LIGHTING

ELECTRIC CAR REFRIGERATION

TRAIN ELECTRIC LIGHTING AND CAR REFRIGERATION FROM THE AXLE

ELECTRIC AXLE LIGHT AND POWER COMPANY
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TRAIN LIGHTING FROM THE CAR AXLE

THIS pamphlet explains (pages 5 to 29) the "*Axle Light*" method of lighting trains electrically, and it is presupposed that the reader is interested. The subject cannot be explained in a word and a picture, and if serious attention is not forthcoming, the following will not prove of interest.

The problem of properly lighting trains is one which every energetic railway manager has been anxious to solve. The traveling public are luxurious in their tastes. They appreciate easy riding, smooth, well balanced roadbeds, freedom from dust, soft chairs, and more than anything else do they appreciate good light. Train lighting is the first point of attack chosen by an adverse press, and the first point of criticism by the public. It is the first luxury to be appreciated if it is good, and the first discomfort to be complained of if it is bad. If you are a railway manager

this is simply a reminder of well-known facts, and if you are not, you can hardly fail to see that the foregoing is obvious.

ELECTRIC LIGHTS AND FANS IN PRIVATE CAR LIBRARY

Electricity is universally admitted to be the best means for lighting, provided a suitable source of supply can be had. Its freedom from dirt, heat, smoke, grease, odor, attention and danger of fire have caused it to win its way against other luminants, though heretofore at higher cost. It is scarcely necessary to more than mention its superiority. The interest centers in the means of producing and supplying the current. Now that it can be installed for train lighting with as little trouble as it can be introduced into a building from a central station supply, it is being rapidly adopted, and an electric

system, offered at a cost less than that of oil or gas, is certainly worth having. The system which this pamphlet describes is of that character.

THE SOURCE OF POWER. The source of power in our system of train lighting by electricity is the axle of the car. It has long been recognized that it was theoretically possible to take power from the car axle and thereby drive a dynamo with which to light the cars; but, though the principle was perfect, its application was not easy. The car axle is a spasmodic source of power; it runs rapidly, slowly, and it stops entirely. It may repeat the performance in a reverse direction. Electric energy taken from a dynamo so driven will vary in pressure or voltage from zero to a maximum, causing the lights to flicker up and down, varying with the speed of the train, and going out when it stops. It is the elimination of these practical difficulties which constitutes our system. Means are provided for causing the lights to burn steadily at all times.

THE PRINCIPLE. The principle of our system may be briefly stated as follows: An electric pressure of thirty volts has been chosen as the most suitable and economical for the lamps, and a storage battery of sufficient capacity to take care of the lights for a maximum of twenty hours is installed in boxes under the cars.

PRIVATE DINING CAR

A dynamo placed in the car truck charges these storage batteries and runs the lamps, whenever it is driven at sufficient speed; when the train is moving slowly, or is at rest, the storage battery alone supplies current to the lamps. An automatic switch-board is provided which switches the dynamo in circuit when its voltage is of the proper amount; switches it out when its voltage is too low, and reverses its armature terminals when it is driven in a reverse direction. The principle is simple, but, to obtain practical and reliable results, called for the expenditure of much time and money.

DRIVING MECHANISM. The method by which the dynamo is driven is the result of practical experience. The system which we have ultimately adopted is that of

friction pulleys, which has many advantages over any other device. Its great simplicity renders it of long life; it is absolutely noiseless, very easy of repair, and an injurious overload in the batteries is impossible.

The dynamo is pivoted on the lower part of its frame to a suspension cradle, and the spring-impelled tension rod draws it towards the split pulley on the car axle, and keeps the friction drive in contact. The illustration given on page 25 shows the arrangement of the generator on the car truck, and also shows the details of the friction pulley.

An important feature of the friction drive obtains in the fact that it does not make a bearing out of the car axle. The most readily suggested device is to drive the dynamo with gears from the car axle, and maintain the pitch distance between centers by means of clasping split bearings, cast on the dynamo frame, about the axle itself. This practice is not at all desired by railway managers, and rightly so. Aside from the trouble of installation, the liability to an overheated bearing in the center of the prime factor of the train's safety, the car axle, is a very serious objection. Railway men already have sufficient trouble with bearings that are essential, to preclude enthusiasm in the incorporation of those which may be avoided.

THE DYNAMO. A picture of the dynamo is shown on page 24. It is built on the enclosed lines of a railway motor. Its immunity from mechanical damage is illustrated from the fact that these dynamos have been recovered from railway wrecks in perfect working condition. They are as exempt from mechanical injury from without as a block of cast iron, and have withstood the test of time and wear by being subjected to extreme conditions which no electric machines, not even excluding railway motors, have ever been called upon to endure. On trains making transcontinental trips the dynamos have within a few hours passed through deep snow, regions of severe frost, been subjected to the sharp, penetrating alkali dust and grit of the plains, been exposed to dampness and moisture, and under these trying conditions have for three years stood the test.

Electrically the dynamo is different from any machine that has ever been constructed. It is so designed as to maintain a pressure of from thirty-two to forty volts, proportioned to the speed. This enables the dynamo to be switched in circuit after the train has attained a speed of, say, ten miles an hour, and to give a uniform pressure to the lamps for any speed exceeding that amount, no matter how much that speed may vary. It is to the ingenious and careful development of this feature that the system owes much of its success.

The dynamo is self-exciting, means being provided for preserving the residual magnetism so that it invariably builds up promptly and surely. No switches or automatic devices of any kind are placed beneath the car in connection with the dynamo. Devices of this character must of necessity be placed in a more protected position. The dynamo is installed once and for all under the car, requires no further attention than the oiling of its bearings from time to time, and, for the sake of precaution, periodical inspection. The dynamo is self-oiling, and a single supply of oil will suffice for a run of from five hundred to seven hundred miles.

SWITCH-BOX. The output of the dynamo is brought up to a switch-box which controls and distributes it. This switch-box, illustrated herewith, is a small locked box placed within the car, and is intended to be opened only by the

CAR SWITCH-BOX

proper inspector at the termini of the road. As far as the car attendants are concerned, it is entirely automatic, they having only to turn on and off the lights and clean the globes and shades. From the illustration of the switch-box it will be noted that an ammeter is provided, which shows at a glance the amount of current coming from the generator.

The action of the switch-box can be best understood by following the train through a cycle of changes of speed. The car is at rest, and the switch-box has switched the dynamo out of circuit and the lights are being supplied at thirty volts by the storage batteries. The car starts, and as it gains speed the dynamo voltage builds up, and when it has reached a potential above that of the lamps it is switched in multiple with the storage battery and the lamps. The lamps, however, are prevented from receiving more than thirty volts by means of resistance which is switched in their circuit at the same instant. Thus the load passes smoothly from the storage battery to the dynamo without a flicker, and the dynamo supplies the lamps and charges the batteries. This condition will obtain as long as the car is going at a speed exceeding ten miles an hour. If the car slow down below this speed the dynamo is cut out. At this time it is delivering no current whatever, and, consequently, there are no arcs at the switch jaws. In fact, all the automatic switches are so arranged that it is impossible for them to open while

they are carrying current. This entirely eliminates arcing, and is one reason why these automatic switches require no attention from year's end to year's end. Arcing is a fatal defect.

SMOKING COMPARTMENT

STORAGE BATTERY. The storage battery used in this system is the best that the market affords, and its location beneath the car may be noted in the illustration on page 26. It is interesting to note that the conditions under which batteries are operated by this Company are conducive to an exceedingly long life. In the first place, the battery is being continually charged and discharged, and it is a primary rule with the storage battery that to keep it healthy it must be used. Current is taken from the battery under the most

favorable conditions, that is to say, the battery is never fully discharged before the dynamo takes hold and charges it again. More often before a tenth of the charge has been used the dynamo starts up, relieves the storage battery of its load, and recharges it. Thus the battery is worked at such times as it is able to deliver its charge at a high efficiency, and it is in this condition that it is best able to stand either use or abuse.

The three great evils which beset a storage battery are:

1. Too rapid discharge; that is to say, a call for more current than the battery can safely supply, a condition which can never occur with this system, because the number of lamps is never greater than the battery can safely carry.

2. Too rapid charge. This contingency is also provided against by means of the design of the dynamo, the pressure of which can never rise above forty volts, no matter how fast it may be driven, and at forty volts the battery can never receive charge at too rapid a rate.

3. Neglect; that is to say, allowing the battery to stand for a long period of time without charge or attention. As the battery is charged almost every time the car is moved it may safely be said that neglect is impossible.

If the storage battery is thus continually charged and discharged it will last an almost indefinite period. In central station work there are cases where batteries have lasted ten

years and are apparently in as good condition as when first installed, this performance being largely due to the treatment of continually charging and discharging. In our system of train lighting the battery is automatically treated in this way to a greater degree than in any other application of the storage battery of which we are aware. In the three years of our *commercial* existence we have not been asked to replace batteries because of deterioration through use.

ELECTRIC LIGHTS AND FAN IN BUFFET

THE LAMPS. An incandescent lamp is a simple and familiar object, but a word or two in connection with the lamps which are used in this system may serve to show a feature of merit. They are operated at thirty volts, are of sixteen candle-power, and have a short, stumpy filament which is not affected by the vibration that obtains

on railway cars. The long, delicate, high-voltage filaments used in street railway work are frequently broken by the vibration, and it has been a great problem with lamp manufacturers to produce a suitable lamp for this purpose. On the low-voltage system this difficulty disappears. The lamps are of surprisingly long life. In a transmission or distribution system where the wire construction is extended, or in a street railway car where the voltage is necessarily high, high-voltage lamps must be used; but in this system of train lighting we are enabled to use a low voltage, because the length of wiring is so short that the loss is insignificant.

LAVATORY

THE LIGHTING DISTRIBUTION.

It is not necessary to dwell extensively on this point. The necessary bunching together of gas jets or oil lamps in the center of the car presents disadvantages easily overcome by electric

lights, which may be so distributed that every part of the car is amply and evenly lighted, as may be seen in illustrations on pages 27, 28 and 29. With the other methods it is well known that some seats are dark, while those adjacent to and in front of the chandeliers are fairly well lighted. It is recognized that dining, boudoir and private cars can only be lighted in every part by means of electricity.

To really appreciate the distribution of electric lights in a railway car one must make a practical examination by traveling in the car, and especially by reading in it, but a partial idea may perhaps be obtained by illustrations on pages 27 and 28, which show the interior of cars equipped with our system.

It may be mentioned that with this system electric fans may be used, which much assist in the ventilation of the car and are so great a comfort to passengers in the heated season.

With the electric system as supplied by this Company, the cars are each provided with from seventeen to eighty lights of sixteen candle-power each, and with from two to eight electric fans, according to the character of the car, thus in all cases providing more light than any oil or gas system, with an air circulation not otherwise provided, and at a minimum cost of maintenance.

INDEPENDENT OPERATION. A feature of value in this electric system is the independence of each car. A complete equipment is provided on every car, thereby rendering it as independent of its adjoining car as if the lighting were performed with oil or gas, but in addition to this advantage the equipments are so designed that in case of temporary interruption to the lighting equipment of one car a connection may be made with the next car, which will supply the lights for both. Failure of supply in an oil or gas system usually means darkness for the car affected.

COST OF OPERATING THIS SYSTEM. Since installing our first commercial orders, some three years ago, we have endeavored to collect data as to the cost of operating our system, every facility having been kindly afforded by the railroad companies to collect actual practical figures. The items of interest and depreciation are clearly ascertainable. Renewals are confined to broken shades and exhausted lamps, and still more occasionally, a new set of brushes for the dynamo. Oil for lubricating the generator bearings, and the item of inspection, can also be exactly defined. As to the cost of power, which might be compared to the item of oil in lamps or gas in gas systems, we have had great difficulty in obtaining data other than theoretical. It is possible to assume a coal economy per horse-power hour and to calculate the

horse-power hours from the indications of the electrical instruments and thus obtain a theoretical figure, but when attempts have been made to discover an additional amount of coal burned, on account of the electric lights, it has been found impossible of computation. All roads have reported that, as far as they are able to determine, there has been no additional expense for coal on account of the electric lights. This apparent absurdity is readily explained when it is remembered that an average high-speed passenger locomotive has a capacity of about one thousand horse-power, and as each car uses for electric lights something less than two horse-power, and the total power consumed for lights is therefore but two-tenths of one per cent. of the power generated in the locomotive furnace, the difficulty of obtaining data can be readily

BOUDOIR

appreciated, especially as the carelessness in firing, the variation in the different grades of coal used, the setting of the valves, and even the stiffness of engine or train bearings, cause variation in the power used. Practical experience, therefore, so far as the books of the companies using our system are concerned, shows the items of expense to be limited to interest, depreciation, renewals and inspection, and in every case the total cost to the railroads has been less than that of any oil or gas system supplying one-half of the candle-power afforded by our equipment.

DANGER FROM FIRE. An eminent authority answers the question as to whether the electric light is safe and reliable as follows:

"The electromotive force of the current employed is so low that a child could suffer no harm from it. There is no reason why the same safety which characterizes its use in stationary practice should not attend its use in lighting trains. The experience in train electric lighting, too, has now been extensive enough to make the fact that no casualties have thus far occurred from it one of some importance."

PATENTS. The system is thoroughly protected by United States and foreign patents owned or controlled by this Company, and all contracts fully provide for the protection of clients.

PRACTICAL RESULTS.

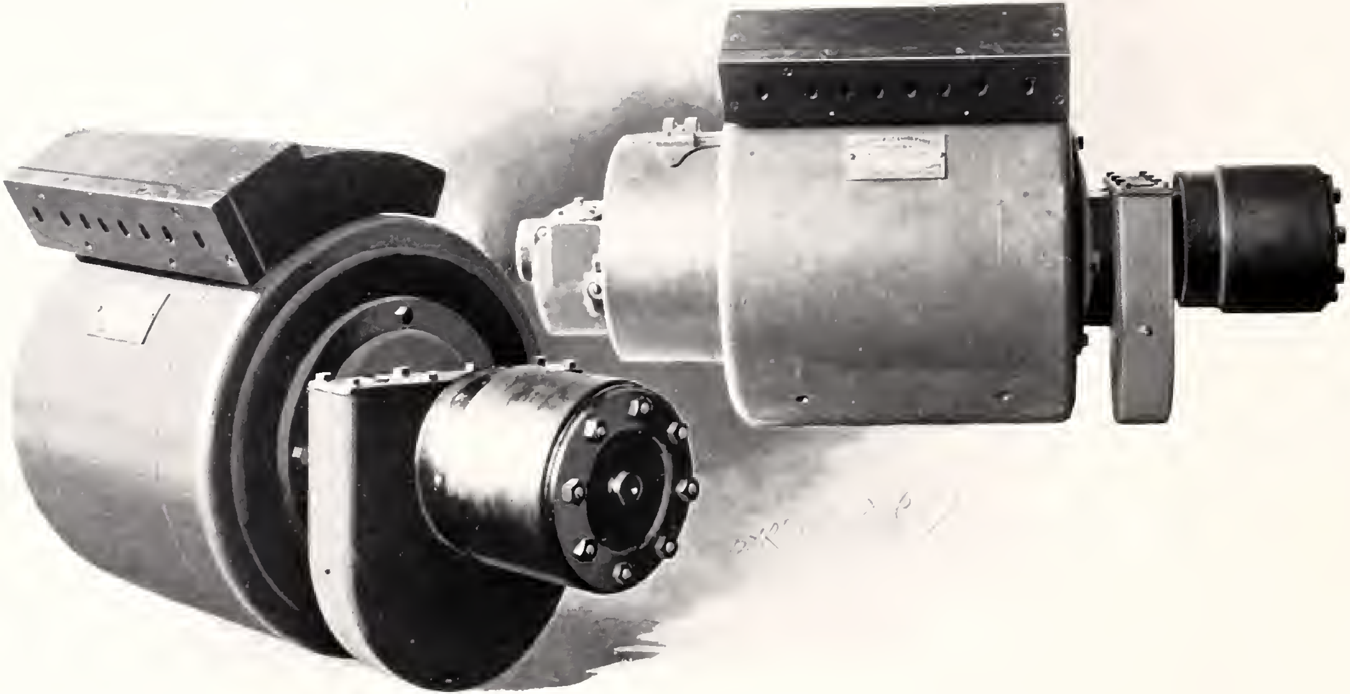
The application of this system in trunk line railways has been productive of much interesting and valuable data. Since fulfilling our first order, the operation of the equipments has been watched through almost every conceivable practical condition, from a twelve-mile surburban run to a railway wreck. As a typical case, the cars were thrown down an embankment, and those cars equipped with electric lights, instead of being in darkness, as were the others, remained lighted, being supplied by the storage battery; and their light greatly aided in the recovery

DISTRIBUTION OF LIGHT IN DRAWING ROOM OF PRIVATE CAR

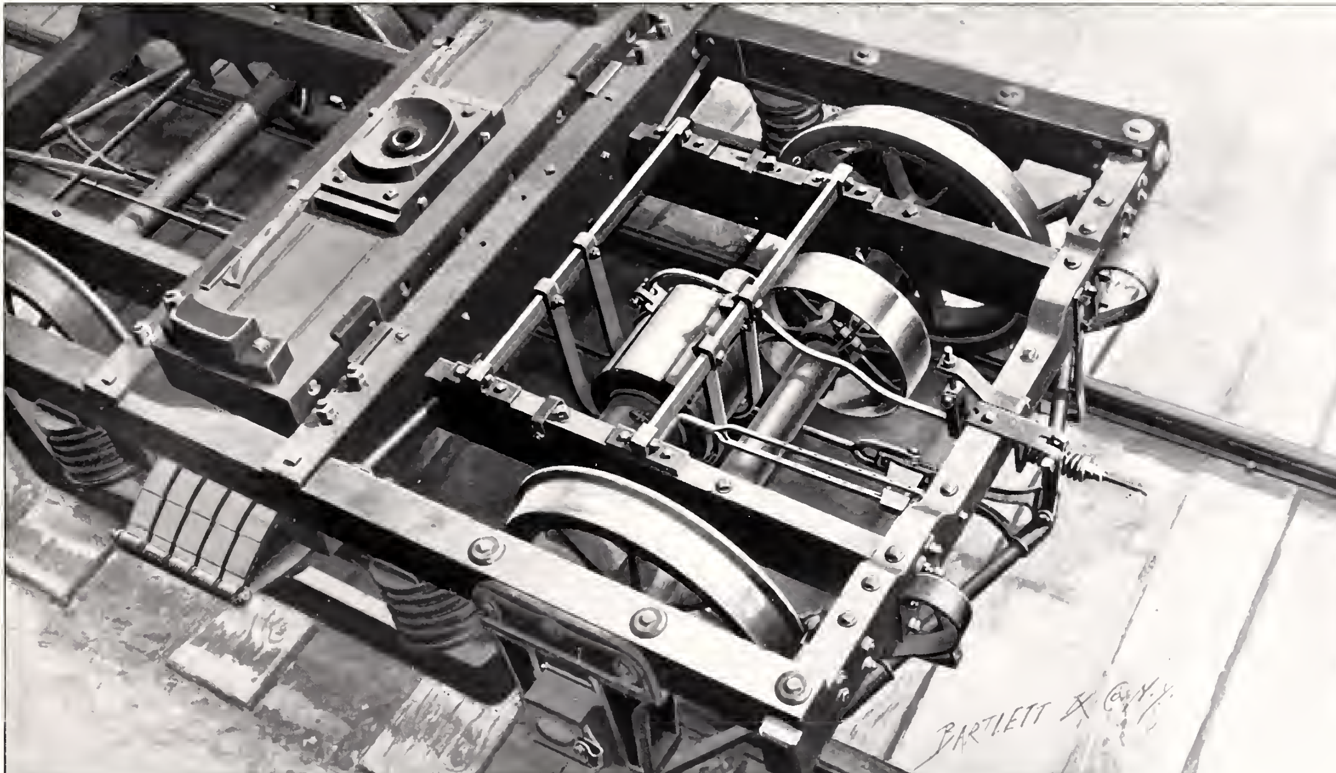
of the injured and in the clearing away of the wreckage. The dynamos and batteries were found to be uninjured.

We have recently learned of some complaints of so unique a character that we venture to relate one. On a certain prominent road our equipments are installed and run in connection with cars otherwise equipped; the conductors complain that they want all electric light or none, for the reason that the electrically lighted cars are always overcrowded, the passengers standing in the aisles rather than taking seats in those lighted by oil or gas, thus interfering with rapid ticket-punching.

CAR PLATFORM LIGHTING



ELECTRIC AXLE LIGHT AND POWER COMPANY GENERATOR
SIDE AND END VIEW

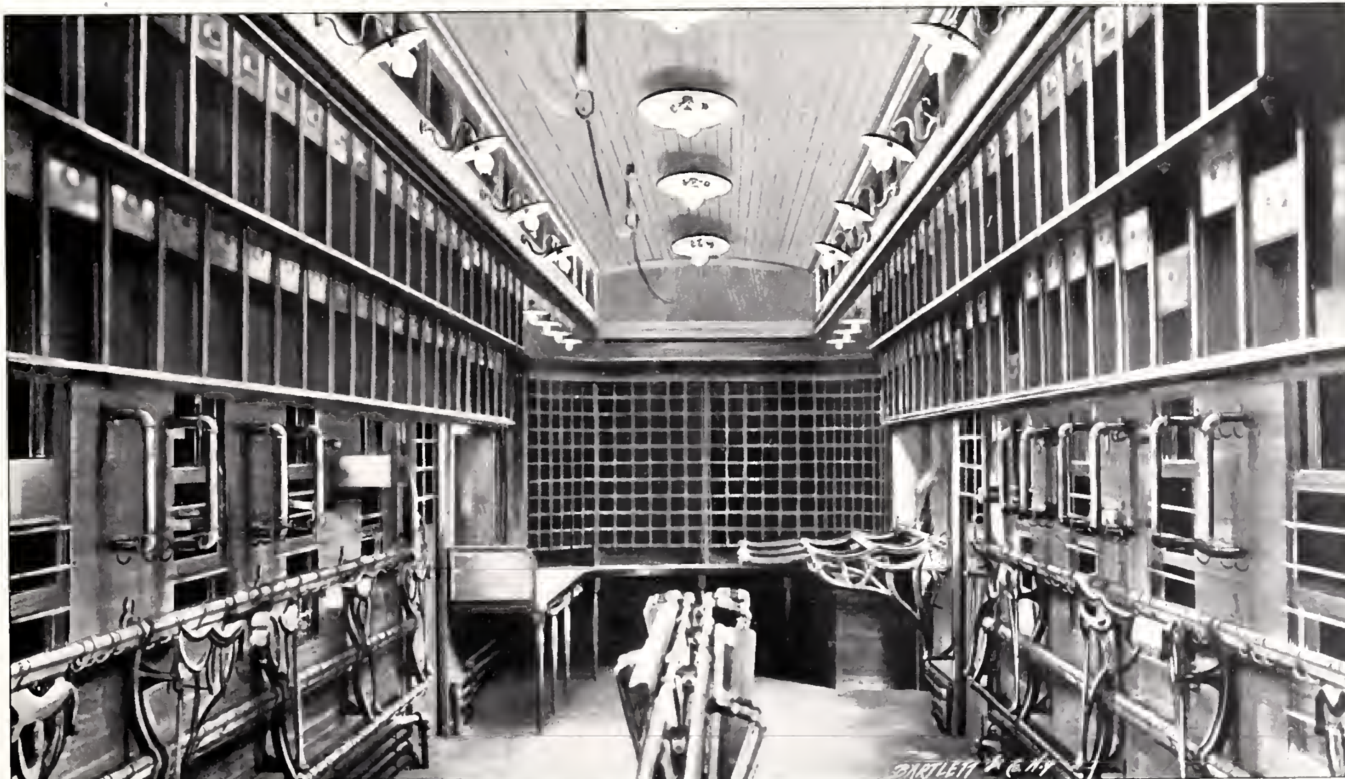


GENERATOR APPLIED TO A CAR AND TRUCK

THE BATTERY BOX IS LOCATED TO THE LEFT OF THE TRUCK AT RIGHT OF THE PICTURE

DISTRIBUTION OF LIGHT IN PASSENGER COACHES
DELAWARE, LACKAWANNA AND WESTERN R. R.

DISTRIBUTION OF LIGHT IN CHAIR CARS
ATCHISON, TOPEKA AND SANTA FÉ R. R.



DISTRIBUTION OF LIGHT IN USE IN U. S. POSTAL CARS


ELECTRIC AXLE POWER
REFRIGERATION EXPRESS

THE ELECTRIC REFRIGERATION OF CARS

THE art of refrigeration from a commercial standpoint, where it has approximately attained perfection, is illustrated in the stationary artificial ice plants which produce a dry, desiccated cold air. Ice, however, only partially solves the problem of refrigeration. The humidity thrown off by it often hastens the decay of the articles instead of preserving them, and thus defeats the purpose which it was intended to perform. Experience has shown that perhaps the most destructive element in a tightly closed room to both wood and metal is a wet, foggy atmosphere, such as is produced in a chamber where ice is employed as a refrigerant.

CRUDENESS OF REFRIGERATION CARS. The necessity of providing refrigeration cars upon railroads for transporting perishable articles has been the cause of creating a railway car service for this purpose which has grown to immense

proportions. This service, notwithstanding its recognized importance, has never progressed beyond its first crude inception and remains to-day in an incompleted condition, expensive to install, costly to maintain and impracticable in a climate where the temperature never reaches the freezing point, precluding the harvesting of ice in the winter to be used for refrigeration during the summer months.

An examination of railroad car refrigeration as it exists to-day in its highest efficiency will disclose its crudeness.

THE REFRIGERATION CAR OF THE PAST. The most efficient refrigeration car, as it is used to-day, is provided with ice chambers located in the interior and at both ends of the car, taking up most valuable space—about one-sixth of the entire interior of the car. Measuring the limited space offered in a car at its cost, every cubic foot taken up by ice chambers is so much loss of valuable room. The ice chambers are coated with expensive metal linings and conductors, which are continually requiring repairs and are therefore expensive to maintain. In the roof of the car, over the ice chambers, hatches are constructed through which these chambers are replenished with ice while the car is in transit; and whenever they are opened, hot air passes into the interior of the car and refrigeration is defeated.

To counteract the effect of this injection of hot air, valuable time and much additional ice is consumed. In the meantime the perishable articles within the car have been subjected to a temporary flood of hot, damp air, and a rising temperature, all of which is most injurious. At no time can a uniform temperature be maintained within a car, for the reason that as the ice continues to melt, the quantity of the refrigerant is lessened and the temperature rises until more ice is added, when the temperature drops back to a lower point. Upon the arrival of the car at its destination, some ice still remains within the box, which is generally allowed to remain there until it melts, leaving in the box a residue of slime which has to be removed at considerable expense before the car can be used again. The injury to this class of car, by reason of the necessity of continual icing, makes it perhaps the most expensive to maintain of any car in the service of a railroad company.

The next point of objection to the icing system is the necessity of erecting ice houses along the route where the ice, during the winter, has to be stored. The cost of taking it from the houses during the summer months and placing it in the cars is very heavy. A system where natural ice is employed cannot be maintained in the Southern States and Mexico, where ice is a luxury and only artificially produced at great expense.

In the icing system there is also the disadvantage of delay, because of icing the cars while in transit; and one of the most objectionable features is the dead weight placed upon these cars by the ice itself, which averages from 8000 to 12,000 pounds per car, for which the railroad companies receive no compensation and which necessitates additional expense in the construction of the cars. Moreover, the drippings from the cars, being largely charged with salt, are destructive to the steel of the railroad tracks and in the bridges.

OBJECTIONS TO THE ICING SYSTEM. The objectionable features of refrigeration cars now in use may be summarized as follows:

1. Valuable space taken up by the ice chambers.
2. Crude method of refrigeration.
3. Instability of refrigeration.
4. Continuous labor attached thereto.
5. Expensive construction of the cars.
6. Excessive cost of maintenance.
7. Enormous dead weight carried by the railroads.
8. Destruction of steel in tracks and bridges caused by salt drippings.

THE RYAN SYSTEM. The system of refrigeration owned by the Electric Axle Light and Power Company is known as the "Ryan System." This system, after being fully and thoroughly tested by the best experts, has proven a practical success beyond all question.

In this system the cars have no ice boxes, and every foot of space in the cars is utilized for the carrying of freight. Illustrations of one of these cars with which a complete test was made during the past summer are shown on pages 30 and 41. The refrigerant generated by this system is cold, dry, desiccated air, which is the highest preservative of perishable articles. This refrigerant is produced by electricity taken from the axle of the car while in motion, the axle generating about two horse-power, of which about sixty per cent. is employed by the process, the remaining forty per cent. being stored in storage batteries within the car, to be used while the car remains idle. By thus storing the surplus power, a car starting, say, from Chicago, destined to New York, will, upon its arrival, have stored sufficient power within itself to maintain the refrigerant for at least three days.

In addition to the storing of this surplus electricity, to be used when the car is not in motion, there is also an apparatus, as shown in the accompanying illustration, marked Figures 1 and 2, whereby the excessive cold is lodged in tanks of brine

compound, which surround the pipes marked *B* and *D* in the illustration, reducing the brine to a temperature of 18° and 20° Fahrenheit, which throws off this stored cold gradually when the car is stationary and not producing actively its own refrigerant.

ELECTRIC CAR CONSTRUCTION. The construction of the car is such that the motive power which produces the refrigerant is taken from the car axle, when in motion, and from the storage batteries when stationary. Should the car remain idle, say, for one month, and all

Fig. I.

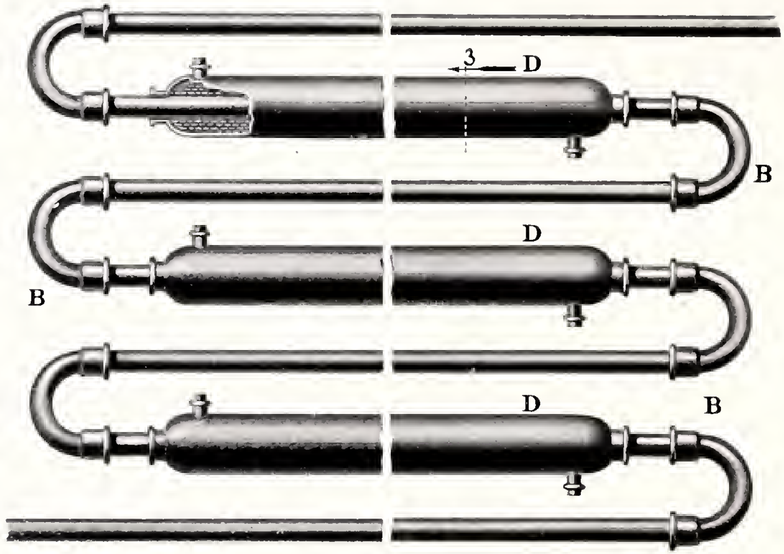
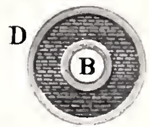


Fig. 2.



Inventor
Thomas J. Ryan

the electricity stored in the batteries become exhausted, the batteries can be quickly and cheaply recharged from a stationary plant until the car again goes into service and generates its own electricity.

Each car is independent of the other; each has its own motive and refrigerant making power, being dependent upon no other means for either generation or motion except that which it maintains by and through itself, thereby rendering each car ready for use when it is sidetracked as well as when it is in motion. The mechanism is simple, operates automatically, and produces an intensely cold atmosphere within the car even in the hottest weather of the warmest climate.

The refrigerant generated can be maintained continuously within one or two degrees of any desired point. In the icing process, under the best conditions, the lowest temperature that can be produced and maintained is about 42° Fahrenheit. Under this system a temperature as low as 20° Fahrenheit can, if desired, be produced and maintained in any climate.

Referring to the details of construction under this system, the cars have no hatches in the roof, thus eliminating one of the most objectionable features in all other refrigeration cars. In the operation of this system there is no delay in transit; there is no expense for maintaining the car above the ordinary; there are no galvanized

iron ice boxes which invariably require expensive maintainance. There is no slime to be removed from the car, at heavy expense, before being again used. The cars equipped with this system can be utilized at all times and are ready for service irrespective of time and place of loading. This system entirely eliminates the necessity of the harvesting and storing of ice for car refrigerating purposes, and the vast labor and expense attached thereto. The weight of the mechanism employed by this system is about three thousand pounds as compared with an average of from eight thousand to twelve thousand pounds required where ice is used.

The cost of the icing system is very high, not only from its maintenance point of view, but also from the refrigerant used, averaging from fifteen to twenty dollars per car per one thousand miles, whereas the cost of the refrigerant under this system will not average over twenty-five cents per car per one thousand miles, and the cost of maintenance nominal.

EXPERT REPORT ON THE RYAN SYSTEM. The following report made by a competent expert of a test of one of the cars of this system will be read with interest:

MR. THOS. J. RYAN,   BUFFALO, N. Y., November 15, 1899.
40 Wall Street, New York City.

Dear Sir:—I have had a great deal of experience in handling and starting different mechanical enterprises, but never, in my recollection, has any one of them started out so satisfactorily as the refrigerating system shown in your car. The general behavior of the installation was perfect in every detail and required no adjustment *whatever* during the entire trip. I would have no hesitancy in loading the car and starting it across the continent, without an attendant. We made a light test at the brewery the night before we left Chicago. Everything seemed to be working perfectly. We took the passenger train, as you suggested, to Bellaire, Ohio; the car arrived about 7 A. M. The temperature in the car registered 38° Fahrenheit. The pressure on the machine was equalized and registered sixty pounds. We again started on our trip about 8 A. M. I kept a record of the entire trip and will make it out in detail when I reach New York. The outside temperature during the day was from 68° to 70° Fahrenheit; the temperature of the car was gradually reduced, and after a ten-hour run registered 30° Fahrenheit or two degrees below freezing. I am satisfied that had the car been filled with beef or any similar freight, the results would have been even better; I am also satisfied that a continuous further run of ten or twelve hours would, had the regulator been so set, have reduced the temperature to about 20° Fahrenheit. The entire results were far better than I had hoped for, and instead of coming within 20 degrees of perfection, which you said would be satisfactory, we have touched the one hundred mark, and I assure you that I am more than pleased with the results, and hope that you will be equally pleased on receipt of this. I am very truly yours,

(Signed) G. F. BEIN.

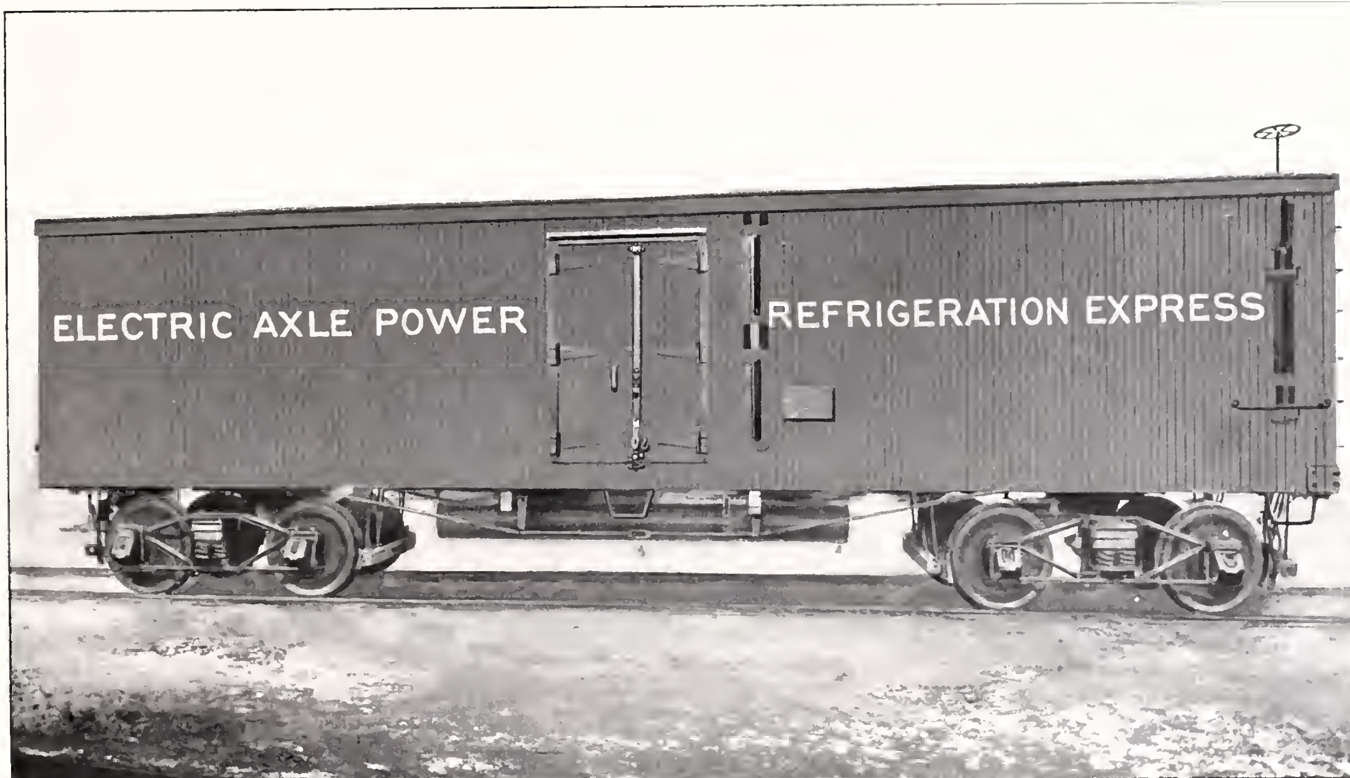
P. S. All the machinery was subjected to several severe tests during the trip. We made stops as long as an hour at a time, during which we drew from the batteries. We were also subjected to a number of severe bumps; one in particular where the train broke in two; as the two separated portions came together we all experienced a terrible shock, but it made no difference whatever with the running of the machinery in the car, nor did it strain one joint in the entire plant. (Signed) G. F. B.

Innumerable attempts have been made in the past to accomplish what this system has demonstrated to be entirely practicable. Past failures have resulted from the fact that no car has ever heretofore been designed which was automatically refrigerated or which did not have to depend, for its generative power, upon an impracticable source, and without provision for power when the car was at rest; therefore, when the car was sidetracked, idle, or in case of a railway wreck, its freight was subjected to too great a risk of destruction to make the system acceptable. All the objectionable features of the icing system of car refrigeration, which have never heretofore been obviated, have been entirely and successfully overcome by the system owned by this Company, which is now offered to the patrons of refrigeration cars.

THE Company offers to intending purchasers, upon application, all essential details regarding its electric lighting and refrigeration systems not afforded by this pamphlet, and places at the disposal of railway officials complete equipments, as erected in the testing rooms of its Engineering Department.

ELECTRIC AXLE LIGHT AND POWER CO.

January 15, 1900 — No. 100 Broadway, New York City.


ELECTRIC AXLE POWER
REFRIGERATION EXPRESS